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2,4,5-T AMINE NOT RECOMMENDED FOR FRILL- TREATING HARDWOOD CULLS IN WEST VIRGINIA

Cull trees and undesirable species may occupy a high percentage of forest growing space. In a managed forest, these unwanted individuals must be cut or killed so that sound vigorous growing stock of good species can utilize the space. The methods most frequently used to eliminate medium-to large-size trees from timber stands are either girdling or application of herbicides in notches or in frills.

Herbicide treatments are preferred for most conditions because subsequent sprouting is less than that after girdling, and kills are somewhat better. On the Fernow Experimental Forest in West Virginia, ammate crystals in notches have been used with good results. However, frill treatments with 2,4,5-T esters have been widely used elsewhere, and are commonly reported to cost less than the ammate-in-notches method.

Although esters are by far the most commonly used chemical form of 2,4,5-T in frill applications, several investigators in recent years have reported good results with amines. In California, Leonard (4) found the amines of 2,4-D and 2,4,5-T to be more effective than the esters of 2,4,5-T when applied to cut surfaces. For best results he recommended using amines in the undiluted form. In West Virginia, Carvell (2) reported the amine of 2,4,5-T to be superior to the ester when applied to frills on white oak. However, he was comparing undiluted amine with esters diluted in water. Stephenson and Gibbs (6), using full strength amine of 2,4-D with the tree injector, achieved almost 100-percent kill of pole-size hardwoods in East Texas. Peevy (5) reported that dilute amines of 2,4-D in frills killed oaks in Louisiana, though not quite so effectively as dilute esters.

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Stimulated by the earlier reports on the merits of amines, we started a small study in 1958 on the Fernow Forest to determine the efficacy of frill treatment with an amine of 2,4,5-T¹ for killing cull hardwoods.

METHODS

In this test, dilute amine solution was used in two concentrations: 8 and 16 pounds agh² in water. Treatments were made in May 1958--about a month after the start of the growing season. The solutions were sprayed in frills made at convenient chopping heights, usually 2½ feet above the ground. Care was exercised when chopping to overlap all cuts. Spray was applied to the point of overflow to insure complete coverage of all exposed wood.

The 8- and 16-pound solutions were applied to 33 and 34 cull trees respectively. Treated trees included 11 species, and a range from 6 to 34 inches in diameter (table 1).

RESULTS AND DISCUSSION

During the first year after treatment, the kill was slightly higher with the 16-pound than with the 8-pound concentration, but the differences became negligible the following year. Kills (complete defoliation) for the 8- and 16-pound treatments were 70 and 71 percent, respectively, at the end of the third growing season. However, the remaining trees did not escape damage; an ocular estimate of the live trees indicated about 80-percent defoliation. The two treatments can be considered about equally effective.

We did not make comparative treatments with esters of 2,4,5-T when this study was made. However, results of such a treatment that was tried on the Fernow Forest a year later can be cited. A 20-pound agh solution of 2,4,5-T ester in oil was applied to frills on 25 large culls. Sixty-four percent of the culls were dead by the end of the second growing season and the remaining live crown on the survivors was estimated at 10 percent. Two-year figures for the combined amine treatments were 45 percent kill and 35 percent live crown on survivors.

This 2-year comparison suggests that dilute esters of 2,4,5-T are superior to dilute amines of 2,4,5-T--or at least they act somewhat faster. Moreover, there is considerable evidence in the literature to indicate that a kill equal to that obtained with the 20-pound ester solution

¹The preparation used was marketed by the Dow Chemical Company under the trade name 'Veon 100'; the active ingredient was the triethylamine salt of 2,4,5-T.

²agh=acid equivalent per 100 gallons of solution.

Table 1.--Species distribution by diameter classes of all trees in both treatments

(Number of trees)

Species	Diameter class in inches													Total
	6	8	10	12	14	16	18	20	22	24	26	28	34	
Black birch	--	--	--	--	--	1	1	--	1	--	--	--	--	3
Red maple	1	1	1	1	3	2	3	--	--	2	1	--	--	15
Sugar maple	--	--	--	--	2	2	3	2	3	--	--	2	1	15
Red oak	--	1	--	--	--	--	--	--	--	1	--	--	--	2
White oak	--	1	--	--	--	--	--	--	--	--	--	--	--	1
Black cherry	--	--	--	--	--	1	--	--	--	--	--	--	--	1
Hickory	--	--	1	--	--	--	--	--	--	--	--	--	--	1
Beech	5	3	3	1	2	1	3	4	--	2	--	--	--	24
Service berry	--	--	--	1	--	--	--	--	--	--	--	--	--	1
Black gum	--	1	--	--	1	--	--	1	--	--	--	--	--	3
Cucumber	--	--	--	--	--	--	--	1	--	--	--	--	--	1
Total	6	7	5	3	8	7	10	8	4	5	1	2	1	67

could have been achieved with a considerably lower concentration of the chemical.

Greater effectiveness, such as that reported by Leonard (4), by Carvell (2), and by Stephenson and Gibbs (6), might have been achieved with undiluted amines rather than with the dilutions that we used. However, the size of many of the culls encountered on the Fernow Forest precludes the use of full-strength amine in the manner described by Carvell because the cost would be prohibitive.³ Use of 2,4-D amine instead of 2,4,5-T amine, and treatment with small metered dosages in spaced cuts (0.5 to 2.0 ml per cut), as suggested by Leonard and by Stephenson and Gibbs, would of course reduce costs for the chemical. However, evidence that can be gleaned from these workers' reports and elsewhere indicates that such treatments would not be effective on large culls of beech, maple, and other hard-to-kill species. These considerations, and the relatively poor performance of diluted 2,4,5-T amine in the present tests, all support the conclusion that no kind or concentration of amine is a good choice for use in frill-treating culls of the type found in our stands.

Poor results with frill treatments usually are associated with rough old culls containing infolded bark from large seams or basal wounds. Such trees are hard to kill because the nature of the defects makes it difficult to cut a complete frill. When using diluted esters, complete severance of the cambium is important because the chemical

³When applied at the same volume rate, use of full-strength amine would require about 25 times as much chemical per unit of tree circumference as a 2-percent by weight (16 pounds ahg) dilution of ester. Although amine formulations of 2,4,5-T are somewhat cheaper than the esters, the cost for chemical per treated unit with full-strength amine still would be around 20 times as much as with diluted ester.

apparently moves very little laterally. Carnes and Walker (1) emphasized that complete frilling is essential for good results in hardwood control. Johnson (3), in the same vein, remarked that 2,4,5-T is no substitute for sloppy ax work. A segment of intact cambium may enable a tree to survive for many years. Nearly all the trees in our study that had live foliage after 3 years had some form of infolded bark that probably had not been completely cut through.

Diluted amine, as used in the present study, did not seem to move laterally any more effectively than the ester. However, Carvell reported good results with spaced cuts on white oaks 12 inches d.b.h. and smaller, which implies that the chemical moves laterally enough to lessen the importance of complete frills on trees in this size range when concentrated amine is used. On larger trees, even with full-strength amine, he recommends complete frills.

If many of the trees to be killed in a stand-improvement operation have defects with infolded bark, herbicide treatments that are effective in some sort of spaced cuts across all diameter sizes are preferable to those that require a complete frill. On the Fernow Experimental Forest, where such trees were common in the unmanaged stands, use of ammate crystals in spaced notches has given more satisfactory results than any tested method employing 2,4,5-T.

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